



George C. Marshall Space Flight Center  
Marshall Space Flight Center, Alabama 35812

FPD-OI-FD21.4  
May 30, 2002

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# ORGANIZATIONAL INSTRUCTION

## Flight Projects Directorate Flight Systems Department Environmental Control and Life Support Systems Group FD21

### Quality Assurance of Environmental Control and Life Support Test Sample Data

#### Revision B

#### APPROVAL

<u>NAME</u>	<u>TITLE</u>	<u>ORG</u>	<u>DATE</u>
<u>Original Signed by</u> _____ Robert M. Bagdikian	Lead, FD21 ECLSS Group	FD21	May 30, 2002

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## DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		7/1/99	Baseline version
Revision	Rev. A	8/1/00	Reformatted to Flight Projects Directorate standard template
Revision	Rev. B	5/30/02	Modified to define current responsibilities and record keeping

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## 1. GENERAL INFORMATION

### 1.1 Scope

This document addresses activities requiring the acquisition and storage of sample analysis data for tests conducted by the Environmental Control and Life Support Systems (ECLSS) Group of the Flight Projects Directorate (FPD). Unless specifically separated, the requirements in this document apply to both Development and Flight test activities. The product available to the customer is quality data in electronic format to be used in development of Test Reports.

### 1.2 Purpose

This instruction documents the responsibilities, processes, and materials by which the Functional ECLSS Data System (FEDS) acquires and maintains quality sample analysis data. It also documents the process by which the ECLSS test customers get access to the FEDS and their data.

### 1.3 Applicability

The policies and instructions outlined in this document apply to all NASA personnel, NASA contractor employees, and non-NASA employees who may be involved with MSFC ECLSS testing.

## 2. APPLICABLE DOCUMENTS

Revision levels of documents are not shown. The latest revision will be used unless otherwise required by contractual requirements or other regulations. In this case the letter revision of the document will be given.

FPD-OI-FD01.4	Management of Information Technology Systems and Services
FPD-OI-FD21.3	Environmental Control and Life Support System (ECLSS) Facility
FPD-OI-FD21.5	Quality Record Maintenance
MPD 2800.1	Management of Information Technology Systems and Services at MSFC
MPD 2810.1	Security of Information Technology
MPG 2800.1	Agency Information Technology Services
MPG 2810.1	Information Technology Security
NPD 2800.1	Agency Information Technology Services
NPD 2810.1	Security of Information Technology

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### 3. ACRONYMS and DEFINITIONS

#### 3.1 Acronyms

COC	Chain of Custody
DBA	Database Administrator
ECLSS	Environmental Control and Life Support System
FPD/FD	Flight Projects Directorate
FEDS	Functional ECLSS Data System
IBM	International Business Machines Corporation
ID	Identification
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
OI	Organizational Instruction
PI	Principal Investigator
SD	Supporting Development
TPS	Test Preparation Sheets

#### 3.2 Definitions

**Analytical Control** The process of blind testing a control sample of known characteristics (concentration) to verify the capability and consistency of the testing laboratory.

**Chain of Custody** The process of controlling custody of a test sample when it is passed from sampler to data custodian to testing laboratory and to others in the testing loop.

**Control Sample** Sample included with the testing samples sent to the certified laboratory by the Test Conductor. The control sample will be analyzed along with the test samples to verify the validity of all sample results in the same batch.

**Port** A predetermined location in the system where the sample will be taken during the test. The location is selected to give the most information about the component and/or the system performance.

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**Sample Processing Control** The process to insure the data integrity of each sample, from testing until loaded into the FEDS database.

**Stage** One phase of a series of tests that describes the characteristics of the test.

**Tank** A meaningful name associated with the port which best describes the hardware where the port is located.

## 4.0 INSTRUCTIONS

### 4.1 Procedure

#### 4.1.1 Test and Sample Identification

The ECLSS Test Facility is responsible for providing test setup data to uniquely identify each sample and its source. These identifiers are Test, Stage, Day, Batch, Group, Subgroup, Port, Lab, Tank, and test beginning date.

#### 4.1.2 Sample Preparation

From the test procedure or Test Preparation Sheet (TPS) containing the sample requirements, the Test Conductor evaluates methods and parameters applicable to the desired analysis. The FEDS Database Administrator (DBA) prepares a work order and enters the analysis description into FEDS. The Data Custodian prepares the sample ID and the required analysis for the FEDS data log according to the test requirement. The Custodian then prepares sample labels and Chain Of Custody (COC) forms from the FEDS database to accompany the samples taken from the tests.

#### 4.1.3 Sample Processing Control

Each sample, labeled with unique sample identification number during testing, is sent to a certified laboratory along with a Chain Of Custody form. The sample is then analyzed and results are sent back in electronic spreadsheet format or hard copy. The DBA checks the format and loads the data into FEDS using data verification programs. These programs check for the proper format and necessary information in each record. Data with correct format will be loaded or it will be rejected. The rejected data will be sent back to the originator for corrections, or it may be corrected by the FEDS DBA upon receiving consent from the originator. After it is corrected, loading of data will be retried. This process will be repeated until all the data are loaded.

#### 4.1.4 Analytical Control

Data in the FEDS are further controlled with data from the Test Conductor. The Test Conductor sends out known chemical compound samples along with many of the samples taken from the tests. The FEDS data loading programs compare the laboratory results of these control samples to the known sample composition. Data will then be marked as "Acceptable" if the lab analysis of control samples is within the acceptable range. Otherwise, it will be marked as "Suspect". Analytical control is defined for each test in the test requirements document

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#### 4.1.5 User Access

Access to the FEDS requires a username and password registered on the FEDS server, and is limited to members of the MSFC domain or other users that have been granted access. Only the FEDS Administrator and FEDS DBA have access to the operating system drive. Principal Investigators (PI) are responsible for the proper use of data originating from their tests.

#### 4.1.6 Server Archiving

The backup program is Seagate Backup Exec Version 6.5 and is executed automatically. Tape is used for all the backups. Incremental backup of the data stored in FEDS is performed once a week. The whole FEDS database is backed up monthly and a backup of the operating system is performed every two months. The FEDS Administrator replaces the backup tape every two months.

## 5.0 NOTES

### 5.1 Responsibilities

FEDS is funded by, and is under the authority of, the ECLSS Group Systems Team Lead. Members of the FEDS team are appointed to fulfill the responsibilities outlined below:

***The Test Conductor*** is responsible for performing tests that are supported by FEDS. The Test Conductor will also procure known consistency samples to complement current sample analysis requirements and submit these samples to a laboratory with samples for routine analysis, with no special marking. The Test Conductor contractually coordinates and qualifies laboratories to provide analysis support, and determines applicable methods and parameters for the sample analysis. Primary responsibilities of the Test Conductor are defined in FPD-OI-FD21.3.

***The Data Custodian*** enters test setup information (test, stage, day, batch, port, tank, group, subgroup, laboratory, etc) from the ECLSS Test Facility and the Test Conductor. The Data Custodian generates sample identification numbers and analysis required from FEDS for each sample according to the test requirement. The Data Custodian produces and maintains the COC for control of the sample per the definition. The Data Custodian is also responsible for maintaining hard copies of sample analysis results.

***The Database Administrator*** determines from the test procedure or Test Preparation Sheet (TPS), the sample requirements, prepares a work order, and enters the analysis description into the FEDS database. The data are entered from direct electronic or paper media into the FEDS database, resolving all computer-generated errors resulting from error checking. The DBA is also responsible for maintaining work orders and electronic copies of sample analysis results.

***The FEDS Administrator*** controls access to the FEDS database, protects the database server from deliberate corruption from the Internet, backs up the server, and plans upgrades to the program.

***The ECLSS Test Facility*** provides test setup information to uniquely identify each sample.

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**Data Users** are responsible for the proper use of the data in analyses and test reports. The user is normally the Principal Investigator of the test.

## 6.0 SAFETY PRECAUTIONS and WARNING NOTES

None

## 7.0 APPENDICES, DATA, REPORTS, and FORMS

### 7.1 Chain of Custody Form

The Chain of Custody form is electronically generated within the FEDS application. A sample Chain of Custody form is contained in Appendix A.

### 7.2 Test Preparation Sheet (MSFC Form 248)

MSFC Form 248 is available electronically at <http://starbase.msfc.nasa.gov:8000/forms/forms.taf>. The site contains the basic MSFC Form 248 (Test Preparation Sheet) and MSFC Form 248-001 (Test Preparation Sheet Continuation). Instructions for completing Test Preparation Sheets are contained in FPD-OI-FD21.3. A sample Test Preparation Sheet is contained in Appendix B.

### 7.3 Work Order Form

A sample work order form is contained in Appendix C.

## 8.0 RECORDS

The Data Custodian is designated the Record Custodian for COCs after completion and for hard copies of sample analysis results in accordance with FPD-OI-FD21.5.

The DBA is designated the Record Custodian for work orders and sample analysis results from supporting laboratories in hardcopy or electronic form in accordance with FPD-OI-FD21.5.

The following table summarizes the Records management requirements:

Record Title	Description of Record	Authority	Retention	Notes
Chain of Custody Forms	Hard copy of Chain of Custody forms for test samples	Maintained in accordance with FPD-OI-FD21.5	3 years	Maintained at MSFC, Building 4755, Room 102A. The Data Custodian is the custodian.
Sample Analysis Results	Electronic copy of test results of samples from supporting laboratories	Maintained in accordance with FPD-OI-FD21.5	3 years	See FPD-OI-FD21.3 Maintained at MSFC, Building 4610, Room 4039 by the DBA.

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Record Title	Description of Record	Authority	Retention	Notes
Test Preparation Sheets	Required to perform configuration changes or other work not covered by another approved procedure or Discrepancy Record	Maintained in accordance with FPD-OI-FD21.3	See FPD-OI-FD21.3	
Work Orders	Hard copy of work orders	Internal record		Maintained at MSFC, Building 4610, Room 4039 by the DBA.
Analyses and Test Reports	Utilizes data from FEDS	Prepared and retained in accordance with preparing organization's OI's		

## 9.0 TOOLS, EQUIPMENT, and MATERIALS

The FEDS database server utilizes a Pentium Pro processor and Windows NT 4.0. There are separate hard drives for operating system and data. A tape backup and Seagate Backup Exec 6.5 conduct automated unattended backups. The FEDS program and database are written with the Microsoft FoxPro 3.0 programming language. The server is located at the desk of the FEDS Administrator, Room 3111, Building 4203, MSFC. FEDS users require an IBM compatible computer with the Windows 95, Windows 98, Windows NT, Windows 2000, or Windows ME operating systems. Registration on the MSFC domain is required and registration on the FEDS server. The executable is located on the FEDS server, and data is delivered to the user's computer in Microsoft Excel format.

## 10.0 PERSONNEL QUALIFICATION, TRAINING, and CERTIFICATION

FEDS is window driven with pull down menus and is self-explanatory. No personnel training or certification is required.

## 11.0 FLOW DIAGRAM

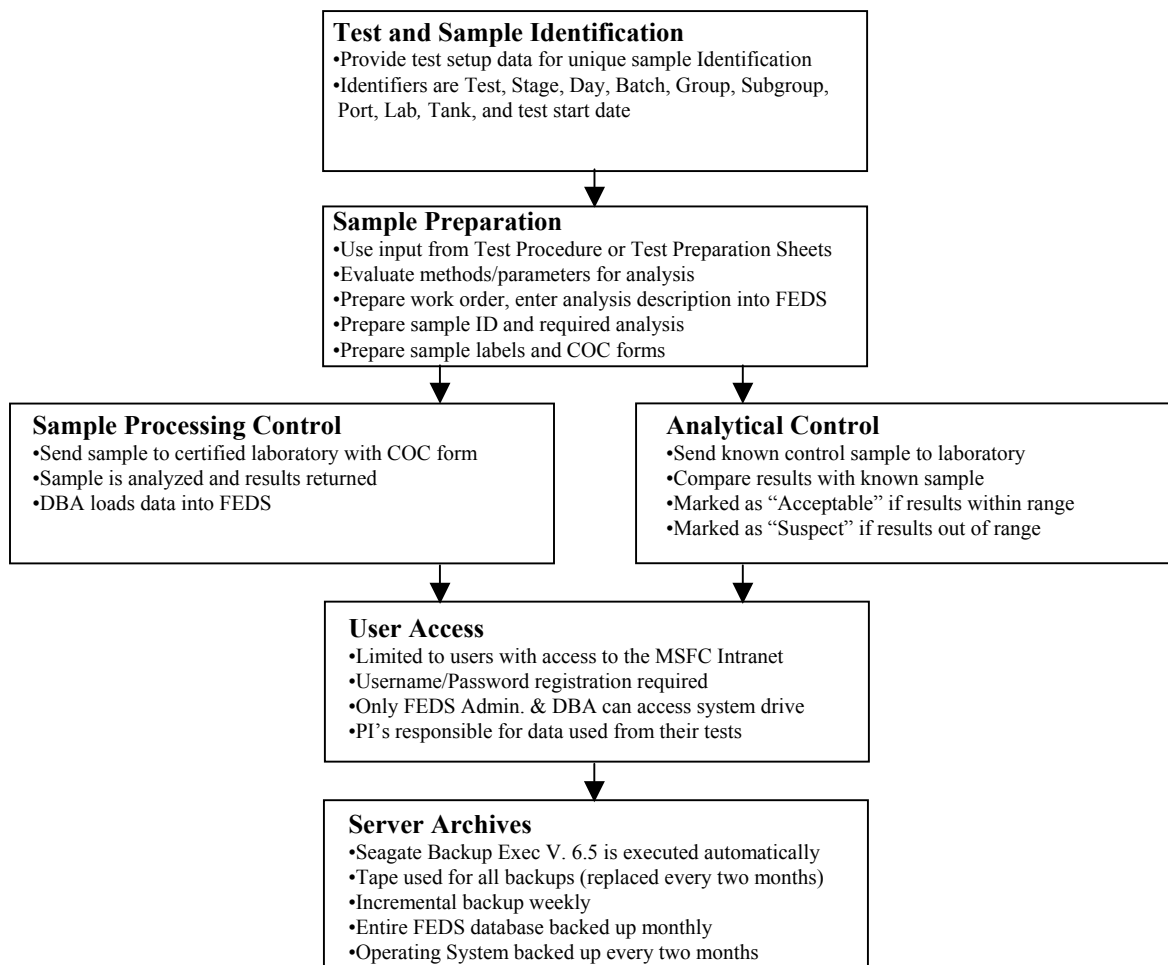
The following diagram graphically depicts the procedure contained in Section 4.1

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**FIGURE 1:** Procedure for Sample Preparation and Testing, and FEDS Access and Archiving



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## APPENDIX A

### SAMPLE CHAIN OF CUSTODY FORM

#### Laboratory Chain of Custody Record

*The National Aeronautics and Space Administration (NASA) - Marshall Space Flight Center (MSFC)*

Customer:		Contact: _____	
		Secondary Contact: _____	
Test:			

Sample			Gas, Water Solid or Surface	Lab Tracking	NASA Tracking Number	#	Analysis Required	Comment
No.	Date	Time						

Sampled By: Signature	Date/Time	Relinquished by: Signature	Date/Time	Received by: Signature	Date/Time
1A		1B		2A	
Relinquished by: Signature	Date/Time	Received by: Signature	Date/Time	Relinquished by: Signature	Date/Time
2B		3A		3B	
Received by: Signature	Date/Time	Relinquished by: Signature	Date/Time	Received by: Signature	Date/Time
4A		4b		5	

NASA-MSFC-EL63 June 1998 - Chain of Custody Form

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## APPENDIX C WORK ORDER FORM

<b>WORK ORDER</b> For <b>Functional ECLSS Database System (FEDS)</b>	
WO Number: _____	
Initiated By: _____	Date: _____
Assigned To: _____	Date: _____
Approved By: _____	Date: _____
Description:	
Resolution:	
Comments:	

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